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IN THE
MANAGEMENT OF EYE DISEASES.
SOME SUGGESTIONS.



BY

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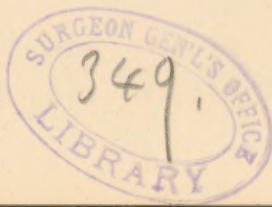
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In the management of a morbid state in any portion of the body, three things must be considered by the intelligent practitioner, viz.: First, the feeding of the parts during a continuance of the morbid state, else death or disablement may occur from simple starvation; second, the removal in so far as possible, of the cause of the morbid state; and third, the placing of the living matter of the part, under such conditions as will most rapidly accomplish the repair of the disabled structure. The management of any disease which accomplishes these three things must be scientific, and, in the main, satisfactory.

Eye diseases are subject to the same general laws of physiology and pathology that govern the diseases of similar tissues in the rest of the body. Hence their management falls under the same general principles. Anatomical and physiological peculiarities simply modify the details of management.

All successful treatment of eye diseases is in its last analysis based upon its ability to accomplish one or more of these things. For instance, take the case of senile cataract. The morbid con-

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dition is a diseased lens (probably from starvation of the lens elements at first). However, when opaque, its management consists in its removal from the axis of vision. In doing this by extraction, care is taken that the feeding of the cornea be not shut off by too large a corneal incision, by too rough manipulation, or by an incarceration of a piece of the iris in the corneal wound. The reparative activities of the wounded parts are stimulated or assisted by the protection of the wound from all agents of inflammation, as germs, mechanical or chemical irritants, and by physiological rest to the wounded parts.

No thoughtful man will question the fact that the same principles apply to every case of eye disease. But the moment we begin to discuss the agencies by which these principles shall be applied in the treatment of any particular case or disease, divergence of opinion at once appears.

As a fact of experience, after more than ten years of careful observation and experiment, I am convinced that in the management of a large number of eye diseases, the use of hot water is a powerful agent in attaining the three things mentioned, viz. : The good feeding of the diseased tissues; the removal of morbid agents; and the promotion of healthful repair. In the brief space allotted to a paper before this body, it is impossible to present in detail the clinical evidence I have collected in support of this claim. I shall only hope to so present the matter as to induce others to give hot water a fair trial. Such trial will convince thoughtful observers that hot water deserves a more prominent place in ocular therapeutics than is usually accorded to it.

In many instances it will accomplish all that is called for in the management of slighter forms of eye troubles, as mild blepharitis, mild corneitis, especially phlyctenular, mild conjunctivitis. I have known numerous cases in which, by a suggestion of one of my patients who had been taught the use of hot water, a goodly number of others had been cured of apparently similar troubles, by it alone. But of these cases I do not now speak, farther than to suggest that in this manner the people have a safe and reliable

substitute for quack remedies and nostrums and old wives' suggestions.

In more severe and grave affections it is used in connection with such other agencies as experience has demonstrated to possess undoubted value. Thus the use of mydriatics and the local abstraction of blood are the ordinary means of combating iritis. To these are added, in cases of specific iritis, the constitutional remedies for syphilis, and in rheumatic iritis such agents as sodium salicylate, while in all cases the general health is carefully looked after. In their place these agencies are all indispensable, but in every case hot water will promote the comfort of the patient, assist in dilating the pupil, and shorten the course of the disease. In addition, there are some cases in which the other remedies have failed to cause any perceptible progress to recovery, that at once begin to improve as hot water is added to the treatment, and go on to a rapid recovery. I have witnessed this in so many cases seen in consultation, that I am sure it represents an important fact. The most skeptical will be convinced when he sees the diminished vascularity of the conjunctiva, the increased dilation of the pupil, feels the diminished tension that sometimes occurs when the deeper tissues of the eyeball are involved, and hears the grateful comments of the patient on the relief from pain and other discomfort.

Similar results are observed from the use of hot water in both catarrhal and purulent ophthalmia, in ulceration of the cornea, and in many intraocular troubles of great gravity. In mild forms of glaucoma, it promotes the comfort of the patient until such time as an iridectomy can be performed. In cases of acute dacrocystitis, it is a most important addition to other treatment and operative procedures. In all these cases it is a prominent factor in relieving the symptom of pain. But there are numerous other diseases of these same tissues, in which there is little, if any, pain present, in which hot water is as important in promoting recovery as in those having pain as a prominent symptom. In this class are interstitial keratitis, true trachoma, corneal opacities, intraocular hemorrhage, turbid vitreous, choroidal diseases, etc., etc.

It will thus be seen that hot water is not ranked as a specific for any particular disease, but only as an important adjuvant to the usual management of most eye diseases. Omitting personal idiosyncrasies and conditions when its use is impracticable, there are no morbid states of the eye upon which it may not exert an influence strongly in the direction of health. This claim is based upon clinical experience, physiological experiment and well known physiological and pathological laws.

The history of the use of hot water in treating eye diseases is a meagre one. Little has been written concerning it. As a domestic remedy it has been employed from time immemorial. As such it has generally been used in the form of a poultice, and so does not constitute a hot water application in the sense that I use it. Even in the profession, it has commonly been employed by means of cloths, sponges, poultices, etc., etc. In a purely empirical manner it has found favor and disfavor during all medical history, and probably long anterior. That it did not continue in use uniformly was probably due to the fact that its mode of action had not been determined, and the means by which it was employed did not always give favorable results.

The data presented by medical history show that the divers results recorded by different observers, bore a close relationship to the method they individually employed in using it. It is plain that if the method was such that the water when it reached the eye was not hot, the results of using hot water could not be obtained. Farther, if sponges, cloths or other substances were employed to convey the hot water to the eyes, we would have the effects of a mechanical irritant added to those of the hot water. Besides, as these substances speedily cool, the effects of warm rather than hot water were more likely to be obtained.

In the American Journal of Medical Sciences, October, 1881, I called attention to the value of hot water in producing a more or less permanent contraction of the blood vessels of the eye. At that time I had for several years been using hot water for the

definite end of producing a contraction of the blood vessels in many diseases. Since then I have continued its use for this purpose with increasing satisfaction. Step by step I learned that hot water would do more than this, and meet other important indications in managing eye diseases. Of these I shall speak presently. That there may be no misunderstanding, I will briefly explain what I mean by hot water. By observation I found that water was hot to some persons at one hundred and ten degrees Fahr., while others would bear equally well a temperature of one hundred and fifteen; others one hundred and twenty; others still one hundred and thirty or even forty. It was found, also, that when persistently used for long periods, frequently during the day, that the temperature which could be endured was progressively greater. Hence, it became evident that the actual temperature must be made to correspond to the peculiarities of the patient. In the beginning I found it convenient to direct the patient to apply the water as hot as the end of the forefinger would bear without scalding. To quiet patients' fears respecting possible injury to the eye from the hot water I told them that the eye would not be injured by the heat of the water, unless the skin dripped from the testing forefinger. As a fact, it appeared that eyes are able generally to bear with comfort water much hotter than the fingers.

Quite as important as the temperature of the water is the method by which it shall be applied to the eye. At first I directed the patient to sit with the head inclined over a large bowl of hot water, and with the hand gently throw the water against the eye, taking care that the hand itself did not touch the eye. This enabled the patient to apply hot water directly to the eye. But it soon became fatiguing in cases where it was desirable to apply it for long periods at a time, and at short intervals. It was also objectionable because of the liability of the water to be spilled, to the annoyance of all parties. It also was difficult to keep the water sufficiently hot.

For special cases I devised a large rubber bulb holding a pint

or more, and so arranged that the eye of the patient could be placed in the large opening at the top. By a tube at the top hot water constantly entered, and the cooler water as constantly escaped at the bottom, stop-cocks controlling the flow, as was necessary to keep the water at any desired temperature. A thermometer was immersed in the water so that the temperature could be regulated with exactness. This apparatus gave excellent results, and was used in many experiments, as well as for therapeutic purposes. The objections to it were its expense, its not being at hand when needed, and its failure to fit perfectly every variety of face. Hence for general practice it could not be made available. Another method found serviceable was the construction of a clay dam on the patient's face, so that when lying flat upon the back the filling of the dam would keep the eye entirely covered with the hot water. The water was admitted and drawn off by rubber tubes arranged in a convenient manner. A thermometer was also placed so that the temperature could be kept at a definite point, as in the preceding apparatus. In several cases of malignant gonorrhœal ophthalmia this apparatus proved extremely useful, and, in my judgment, saved the patient's eyes. Still the disadvantages of this method are insurmountable for general use. It requires too much care and intelligent watching, and so is limited to the few cases attended by proper conditions.

The last method I shall mention is free from all of these objections, and leaves little to be desired. Briefly, it consists in the application to the eye of hot water by means of a common tumbler. The glass is filled to the brim, the head slightly bent forward, and the glass so applied to the face that a dam is formed with the face below the eye and the side of the nose, so that the eye is fully immersed in the hot water. As the mass of water in the glass is considerable, the water will remain some moments at the proper temperature. As it can be renewed in a second, it is possible, with a small amount of fatigue, to keep the eye immersed in hot water by the hour, if called for. It will be

apparent that the water can be made aseptic or antiseptic, as may be desired in any special case. Clearly this method meets all the requirements for universal application, as it is inexpensive, the apparatus being found everywhere within the limits of civilization.

The use of hot water by any of the methods described is safe; without the watchful care of the physician it may not accomplish all the good possible, but it will have done no harm. The same cannot be said of other and common modes of applying moist heat to the eye. Irreparable damage often follows the application of moist heat by means of some solid substance. Among the substances employed the most common is the poultice. As a general rule, this should never be applied to a diseased eye unless under the personal observation of a physician, if it is desired to obtain the benefits of hot water. With the greatest care, it is extremely difficult to get the good effect of hot water, while avoiding the evil effects of the mode of application. In unskilled hands the most dire results are frequently witnessed. All poultices cool soon, and in such a condition they have none of the virtues of hot water, while they have the power of inducing and intensifying the very conditions which hot water tends to relieve. They dilate the blood vessels and render the circulation beneath them sluggish. Hence, if the cornea be suffering from lack of blood they still farther starve it, and so tend to the destruction of corneal tissue. The poultice in any of its numerous forms is an unsafe and unreliable means of applying hot water to the eye.

In many cases the poultice mechanically irritates an eye already in an irritated condition. This would be objectionable, if we were able to keep the temperature at the proper degree for a length of time.

The poultice is a dirty affair, inconsistent with the aseptic principles of modern surgery, especially when it is applied to surfaces which have lost any portion of their epithelial covering.

In it may be countless morbid germs, and under it may be developed countless more poisonous elements.

The compress is another form of applying moist heat to the eye. It is less objectionable than the poultice, in that it causes less irritation mechanically, is less likely to get cool, and far less likely to become the carrier of morbid material. As a substitute for pure hot water it may occasionally be used, as a matter of necessity or convenience, but the results are, speaking generally, less favorable. Singularly, those who have used hot water in this form object to the use of hot compresses in acute affections of the conjunctiva and cornea, while they loudly commend their use in chronic affections of the same tissues. Apparently this is due to the fact that chronic diseases bring the eye into such a state of toleration that it will suffer less harm from the mechanical irritation of the hot compresses. Had these observers employed hot water in the manner suggested, they would have been quite as enthusiastic over its use in treating acute, as chronic, affections of the eye.

A form of compress, sometimes called for in the treatment of ophthalmia of the new born, is made of absorbent cotton. Watched as are similar plegets, when used to apply cold to the same class of cases, they are safe and efficient, though less so than the water alone. As they are likely to be applied by the average nurse or attendant they are dangerous in the extreme, as promotive of suppuration rather than the reverse. Especially is this true if the cornea becomes involved in the disease.

It will thus be seen that I make a marked distinction between the effects of simple hot water applied directly to the eye, and the effects when any solid substance is employed, as a poultice, compress, etc., etc. The first I have invariably found beneficial, and never harmful, while the latter often fails to do good, and frequently does irreparable damage.

We are now ready to ask, what are the local effects of hot water applied to the eye?

My first proposition is that *hot water causes a contraction of*

the blood vessels in and about the eye. The proofs of this are many.

1. With the apparatus already described I have carefully studied the effects of hot water upon the human eye, and have always found that when applied for a sufficient length of time it bleaches the normal tissues. This can be seen in the eyelids and in the conjunctival tissues. The time required varies with different conditions and in different persons, but by regarding these it can be obtained. The longer the application is continued the longer do the effects remain when the water is removed.

2. In operations upon the eyelids and external portions of the eye, as well as during the hemorrhage which sometimes complicates an iridectomy or injury to the eye, I have found that hot water most quickly and effectually controls the hemorrhage. What is still better, it stays controlled, while after using cold the hemorrhage is likely to recur speedily.

3. In cases of blepharitis, conjunctivitis, in iritis, in acute dacrocystitis and other inflammatory affections of the external portions of the eye, the same results have been observed to follow so generally that I have learned to expect them with the same certainty that I do local anæsthesia from cocaine, applied to the conjunctiva. If these do not follow I know that the hot water has not been properly applied.

4. With the ophthalmoscope I have examined many eyes before and after the local application of hot water for from ten to twenty minutes, and found uniformly that the retinal vessels were reduced in size. In a subjective way I first noticed this upon myself. After some very exhausting work, during an attack of indigestion, my retinal vessels became so dilated as to seriously interfere with my distinct vision. Having in my mind the properties of hot water under consideration, I placed my eyes in water at a temperature of one-hundred and thirty degrees Fahr., and at the end of ten minutes the disagreeable phenomenon had disappeared. Shortly after this a gentleman applied to me for relief from a similar condition. With the ophthalmoscope I

ascertained the size of the retinal vessels, and made a drawing of the same. Then I caused him to use hot water locally as described. At the end of eight minutes he affirmed that his eyes were all right. An ophthalmoscopic examination showed that the vessels were reduced to their normal size and even less. A comparison of the drawing of the vessels before and after the use of the hot water, was additional evidence of the truth of the point in question. Continued clinical observation of similar cases has given me great confidence in the power of hot water to control the action of such blood vessels of the eye as retain sufficient vitality to respond to local remedies.

5. Surgical, obstetrical and gynaecological practitioners all tell us that hot water contracts the blood vessels, checks hemorrhage and keeps it checked. The evidence here is abundant and conclusive.

6. Dr. R. H. Murray (Edinburgh Medical Journal, August and September, 1886) details some very accurate studies of cold and heat upon the blood vessels of the uterus. He found that water at a temperature of from one hundred and ten to one hundred and twenty degrees Fahr., constricts blood vessels and arrests hemorrhage from small arteries. Water at from sixty to one hundred degrees dilates small blood vessels and promotes hemorrhage. Water at from thirty to fifty degrees checks hemorrhage by constricting blood vessels, but this only temporarily. After water at these temperatures has lost its power to contract blood vessels, water at a high temperature is still effective. From these experiments it is clear that hot water acts very promptly; that it produces a long contraction of the blood vessels; that there is an absence of vascular reaction; that there is no exhaustion following its use; and that the parts avoid all shock.

My second proposition is: *Hot water will wash away or destroy or render less harmful morbid agents in and about the eye during the progress of many diseases.*

Concerning the first part of this statement there can be no difference of opinion. All will grant that hot water will wash out

of the conjunctival cul-de-sacs, secretions, excretions, products of inflammation, foreign substances, etc., as readily as any other liquid. Few will doubt that it will do it better even than cool or cold water. As a mechanical detergent for the eye, hot water stands first.

2. Water at a temperature of from one hundred and ten to one hundred and forty will certainly check some forms of putrefaction. It matters little whether it does this by rendering less active the germ agent which produces the mischief, or by repairing its damages, or by rendering the tissues less susceptible to its ravages. The practical end is the same. I have so frequently observed the changes in the secretions of the eye under the influence of hot water that I am positive as to the result. Concerning the exact *modus operandi*, I am not in a position to express a positive opinion.

Dr. Heyl (Archives of Ophthalmology, September, 1886) gives reasons for believing that hot water acts beneficially in purulent ophthalmia, by placing the tissues in a condition unfavorable to the growth of *Gonococcus* of Neisser. The same thing is done by the application of nitrate of silver. Hence he commends in this form of disease applications every three hours of a weak solution of nitrate of silver, carefully neutralized with constant applications of hot water.

Dr. Geo. Sternberg (American Journal of Medical Sciences, July, 1887) gives some experiments made to determine the degrees of heat necessary to destroy different micro-organisms. He found that a temperature of 132° Fahr., was fatal to the bacillus of anthrax, the bacillus of typhoid fever, the bacillus of glanders, the spirillum of Asiatic cholera, the erysipelas coccus; the virus of vaccinia, of rinderpest, of sheep pox, and probably of several other infectious diseases. As the eye will endure a much higher temperature without injury, as we have demonstrated, it is clear that at least some micro-organisms may be destroyed by the use of water of such a temperature as may safely be applied to the eye. The principle being established, farther observation

will determine the limits of its application, and it will become a recognized factor in the management of such diseases of the external portions of the eye as are caused or maintained by micro-organisms.

My third proposition is, that *the local application of hot water to the eyes, in the manner described, promotes the healthful activity of the living protoplasm or living matter.*

One function of living matter is to separate from the blood currents such elements as are required for the repair of worn-out tissues, and elaborate them into tissue proper. Another scarcely less important function is to remove the broken down or effete materials. Upon the proper performance of these two functions the integrity of any portion of the body depends. That the regulation of the blood currents is essential to such performance is self evident. Perhaps this may explain the quickening of reparative processes, observable when the eye is suffering from conjunctival or corneal inflammation. Still I think we must look farther for an adequate cause. Other remedies, notably cocaine, are capable of contracting blood vessels, but they also, in some manner, interfere with the nutrition of the parts, so that they are harmful in purulent corneal troubles, and of doubtful utility in other conditions.

It is well known that each portion of the body thrives best when kept at a given temperature. When it is enfeebled by disease, a different, and generally a warmer, temperature is called for. In other cases a lower temperature is demanded lest the parts be destroyed by the excessive heat. The temperature must be elevated or lowered, as called for under such varying conditions. It would seem from this statement of the case that the natural application to an eye, when its temperature was elevated by an acute purulent inflammation, would be cold. But I have often seen the temperature lowered nearly to the normal by the local application of hot water. When this can be done it is a safer line of practice. That it can be done in every case I cannot affirm, as my observation is limited to a few cases, but in none of

these was an exception found. I have explained this effect by assuming that a better circulation through the diseased parts was effected, some of the morbid materials were removed, and the living tissue placed in such conditions that it could act more effectively in resisting the encroachments of morbid agents, and better repair damages. This is not singular as applied to eye diseases, as it has been observed in many other organs, and, to the student of general medicine, may seem trite.

My fourth proposition is: *Hot water has great power in relieving muscular fatigue and spasm.*

Like all other muscles those of the eye often weary after excessive use. When ocular defects exist fatigue is earlier and more marked. For the relief of this distressing condition I know nothing so efficient as hot water. In the researches of Dr. Murray, already referred to, he gives some exact studies of the uterine muscle, as acted upon by hot water. He found that the application of water at a temperature of from one hundred and ten to one hundred and twenty degrees Fahr. caused the muscle to contract almost instantly. The relaxation was from twelve to twenty times the duration of the contraction. Successive applications were followed at once by a response. The efficiency of the contraction was greatly increased. The periods of relaxation and maximal contraction were much increased. In four experiments there was a gain of four times the initial efficiency. Continuous application induces a high degree of contraction, broken by secondary waves of partial relaxation and contraction. Thus the applications of hot water actually increase the contractile power of the muscles.

On the other hand, he found that water at a temperature of from thirty-two to sixty degrees Fahr. caused the muscle to contract slowly, produced a relaxation three times the duration of contraction, and destroyed the power of contractility except after a period of rest. Continuous application of the cold water produced rapid exhaustion of the muscle, so that it soon failed to respond, being completely relaxed.

From these data it would seem evident that in cases where it is desired to increase the efficiency of the muscles of the eye, the use of hot water is clearly indicated, and that of cold contra-indicated. It matters not how the exhaustion be induced, hot water is a most efficient agent in relieving it. Frequently in cases of insufficiency, moderate in extent, of one or more of the recti muscles, we have seen it cease to trouble the patient after a continued use of hot water locally applied. In most cases, however, it is necessary to correct existing defects by the use of prisms, changing the insertion of the muscles, etc., the hot water affording only temporary relief. After operations for squint I always order the local application of hot water for a considerable time, in order to bring the muscles most quickly to their greatest vigor, and so enable me to ascertain the full effect of the operation. The liability to over-correction is thus materially diminished, because the full effect of the first operation is more accurately determined before the last is performed. No doubt hot water induces these effects by other means than by its direct action upon the muscles of the eye, but it is to the latter that we now direct attention.

Admitting the propositions advanced to be substantially correct, what is their practical application to the management of eye diseases? It seems to us that every thoughtful student of such cases will at once be able to designate numerous conditions in which the patient would receive great benefit from the local use of hot water.

Active and passive congestions and inflammations, both without and within the eyeball, would all be benefited by so regulating the current of blood through the eye so as to enable it to approach the normal standard. It is not claimed that hot water will do this in every case, but it will materially assist such other remedies as may be employed for this purpose. In the external diseases there is always some morbid agent, which this use of hot water will remove. And finally, in every case the diseased tissues need all the assistance afforded by hot water to enable

them to return to a normal condition. The list of extra and intra-ocular inflammations is a long one, and need not be enumerated here. All will be more or less benefited by the common sense use of hot water, to the extent of obtaining its physiological and therapeutic effects.

Another class of cases in which the effects of hot water are very desirable are those in which muscular strains, weaknesses and pains form a part. Of course, the causes of these muscular derangements must be ascertained and, if possible, removed. This being done, most cases require no farther attention, but, meantime, the hot water adds materially to the patient's comfort and expedites the recovery. Sometimes this can be but imperfectly accomplished, or not at all. Here the regular use of hot water two or three times a day, for from ten to twenty minutes at a time, more or less, according to the nature of the case, will greatly add to the patient's comfort, and materially enlarge the working capacity of his eyes.

Another class of cases benefited by the local application of hot water are injuries to the eye. In such cases as admit of its use, hot water renders the patient more comfortable and materially hastens the reparative process.

Doubtless an occasional idiosyncrasy may interfere with the use of hot water in a special case, but I have seen few such cases. Almost invariably, aside from the trouble, the patients are so materially relieved by the applications that they are greatly pleased. Hence they are the more ready to endure the trouble called for by the treatment.

I desired to detail typical cases, with the actual treatment in each, as illustrative of the use of hot water in the manner described. But time forbids. In conclusion, I present the following summary of the points I have endeavored to make plain :

1. The best effects of hot water in eye diseases can only be obtained when the water is so used that it comes into direct contact with the eye. In practice, this is best done by means of a common tumbler filled to the brim with water at the appropriate

temperature, and so adjusted to the face that the eye is immersed in the water.

2. By hot water, in this connection, is understood water at the highest temperature the patient can endure, viz., from 105° F. to 140° F. Lower temperatures produce quite other effects than those desired.

3. The hot water must be applied long and often enough to accomplish its peculiar effects.

4. The peculiar effects of hot water are: (a.) The contraction of blood vessels both within and without the eyeball, reducing them to a size approaching, if not equal to, the normal. (b.) The removal of some of the causes of disease, if such exist, on the conjunctiva or other external portions of the eye, and the rendering of other causes less harmful. (c.) The promotion of a greater reparative activity of the normal living matter about the morbid material. (d.) The removal of muscular irritation or spasm and the promoting of the normal vigor of the muscular tissue.

5. Finally, hot water does its work without any shock to the nervous system, or without any loss to the actual energy existing in the eye, and without any possible harm to the eye.

6. It is the one application that has no disadvantages or drawbacks aside from the trouble that it involves.

